A process for making stain resistant nylon fibers from a mixture of nylon and highly sulfonated nylon copolymer is disclosed. The highly sulfonated nylon has greater than about 4.0% weight of aromatic sulfonate incorporated into the polymer structure and an unexpectedly low solid particle content as measured by Flow Vision Particle Analyzer and melt filtration studies. Also disclosed is the process and composition of the highly sulfonated nylon copolymer.

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Citations

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Claims

1. A process for making stain resistant nylon fibers comprising,
   melt blending a mixture of polymers, the mixture comprising a nylon polymer and a sulfonated nylon copolymer, wherein the sulfonated nylon copolymer contains greater than about 4.0% weight of an aromatic sulfonate or an alkali metal salt thereof, and spinning the polymer mixture into stain resistant fibers.

2. The process of claim 1 wherein the alkali metal is lithium.

3. The process of claim 2 wherein the sulfonated nylon copolymer is the polymeric reaction product of a mixture consisting essentially of a nylon monomer or combinations thereof, a lithium salt of an aromatic sulfonate and a diamine.

4. The process of claim 1 wherein the sulfonated nylon copolymer has a low solid particle content.

5. The process of claim 4 wherein the sulfonated nylon copolymer has a total Flow Vision Particle Analyzer count of less than about 200 particle counts per minute.

6. The process of claim 4 wherein the sulfonated nylon copolymer has a melt filtration pressure increase value of no greater than about 2000 PSI/Hr.

7. The process of claim 2 wherein the sulfonated nylon copolymer comprises from about 5.0% weight to about 10.0% weight of an aromatic sulfonate or a lithium salt thereof.

8. The process of claim 2 wherein the sulfonated nylon copolymer has a sulfur level of at least about 5,500 parts of sulfur per million parts of copolymer.

9. The process of claim 3 further comprising adding a pigment to the melting mixture of polymers to impart color to the stain resistant fiber.

10. The process of claim 4 wherein the nylon polymer is nylon 6/6 and the amount of sulfonated nylon copolymer is from about 10 % to about 35% by weight of the polymer mixture.

11. A process for making a sulfonated nylon copolymer comprising
   polymerizing a reaction mixture including a nylon monomer or mixtures thereof, an aromatic sulfonate or an alkali metal salt thereof and a diamine under conditions so as to give the sulfonated nylon copolymer, wherein the sulfonated nylon copolymer contains greater than about 4.0% weight of an aromatic sulfonate or an alkali metal salt thereof.

12. The process of claim 11 wherein the alkali metal is lithium.

13. The process of claim 12 wherein the nylon monomer is a nylon 6/6 salt.
14. The process of claim 13 wherein the diamine is hexamethylene diamine.

15. The process of claim 11 wherein the sulfonated nylon copolymer has a low solid particle content.

16. The process of claim 15 wherein the sulfonated nylon copolymer has a Flow Vision Particle Analyzer count of less than about 200 particle counts per minute.

17. The process of claim 15 wherein the sulfonated nylon copolymer has a melt filtration pressure increase value of no greater than about 2000 PSI/Hr.

18. The process of claim 12 wherein the sulfonated nylon copolymer comprises from about 5.0% weight to about 10.0% weight of an aromatic sulfonate or a lithium salt thereof.

19. The process of claim 14 wherein the weight ratio of nylon 6/6 salt to the salt of the aromatic sulfonate and hexamethylene diamine is from about 12.7:1 to about 5.8:1.

20. The process of claim 19 further comprising maintaining the reaction melt temperature at a value of at least about 250.degree. C. prior to reduction of the reaction vessel pressure.

21. A sulfonated nylon copolymer having the general formula ##STR2## wherein M.sup.+ is an alkali metal and the numeric ratio of a:b is from 18:1 to 8:1.

22. The sulfonated nylon copolymer of claim 21 wherein the alkali metal is lithium.

23. The sulfonated nylon copolymer of claim 21 wherein the sulfonated nylon copolymer has a low solid particle content.

24. The sulfonated nylon copolymer of claim 23 wherein the sulfonated nylon copolymer has a Flow Vision Particle Analyzer count of less than about 200 particle counts per minute.

25. The sulfonated nylon copolymer of claim 23 wherein the sulfonated nylon copolymer has a melt filtration pressure increase value of no greater than about 2000 PSI/Hr.

26. The sulfonated nylon copolymer of claim 23 wherein the sulfonated nylon copolymer has a sulfur level of at least about 5,500 parts sulfur per million parts nylon copolymer.

27. A process for making a colored stain resistant nylon fiber comprising melt blending a mixture of polymers and a pigment, the mixture of polymers comprising a nylon 6/6 polymer and a sulfonated nylon copolymer, wherein the sulfonated nylon copolymer contains greater than about 4.0% weight of an aromatic sulfonate or a lithium metal salt thereof and has a low solid particle content such that the sulfonated nylon copolymer has a Flow Vision Particle Analyzer count of less than about 200 particle counts per minute and a melt filtration pressure increase value no greater than about 2000 PSI/Hr, and spinning the melted mixture of polymers and pigment into the stain resistant fiber.

28. The process of claim 27 wherein the sulfonated nylon copolymer comprises from about 5% to about 10% by weight of an aromatic sulfonate or a lithium salt thereof.

29. The process of claim 28 wherein the sulfonated nylon copolymer in the polymer melt is from about 10% to about 35% by weight.

30. The process of claim 29 wherein the sulfonated nylon copolymer is the polymeric reaction product of the polymerization reaction of a mixture consisting essentially of a nylon 6/6 salt, a lithium salt of 5-sulfoisophthalic acid and hexamethylene diamine.